

# DIGITEL HVS DH-77



# DESIGN AND SYSTEM DESCRIPTION - DIGITEL HVS DH-77

## Introduction:

DIGITEL High-Volume Samplers DH-77 are systems to sample dust and aerosol particles for later assessment and analysis (gravimetric and analytical determination). The sampler operation range in standard execution is 100 to 1.000 litres per minute (6 to 60 m<sup>3</sup>/h). The devices can be integrated in automatic monitoring systems via various interfaces. The field housing of the DIGITEL HVS DH-77 is suited for outdoor installation. The device is easy to transport and because of a good sound insulation very quiet. Superior workmanship in sampler mechanics backed by the latest technical and electronic control will guarantee a long life-time and an absolutely reliable operation.

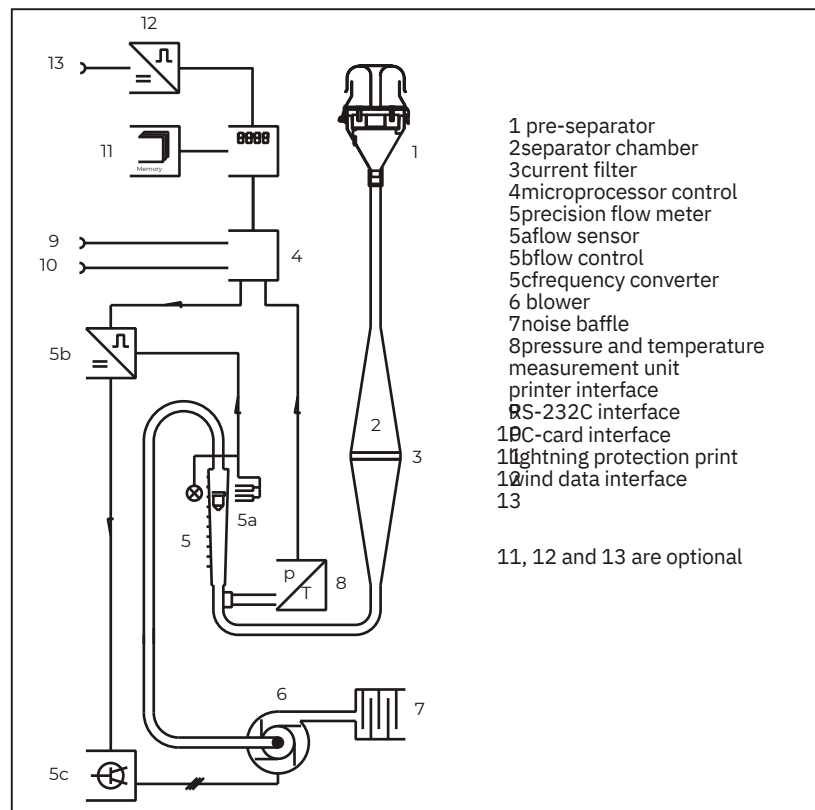
## Features:

An integrated microprocessor unit controls all relevant data and events. The status "work" and "pause" (start time) can be programmed with a resolution of one minute. The constant flow of sampled air through the filter is dynamically controlled, so that this value is kept at good reproducibility and at long-term stability which keeps to a minimum of electrical power consumption.

The blower is maintenance free and ensures a long service life (MTBF > 36.000 hours).

All mechanical components of the unit needed for measurement are provided with a highly corrosion-resistant and extremely smooth "Ematal" surface.

Due to the large surface filter there is a low flow velocity and because of the homogeneously loading of dust and aerosol particles on the filter, the filter allows to be segmented for different analyses. The DIGITEL HVS DH-77 supports different interfaces for data transmission and remote control. The systems are in operation in important monitoring networks at home and



Block diagram of DIGITEL High Volume Sampler single filter unit DH-77

abroad.

## Design and operation:

The air is sampled via a pre-separator (1), using a sampling tube, vertically from the top to the bottom through the filter (3) placed in the separator chamber (2). After the filter, the transported air quantity is measured using a flow meter with a floater (5). Its double photo-sensor (5a) optically senses the floater position. In connection with the control electronics (5b, 5c), the capacity of the blower (6) is adapted to the rpm control, so that the air quantity keeps the set-point value. Air pressure and temperature (8) are measured upstream the flow meter and continuously averaged by the controller. A real-time protocol states sampling volumes yielding from the sampling time and controlled volume flow as the core information. The air is released from the instrument with reduced noise through noise baffle (7). The sampling protocol lists the effective and the standardised

volume of each filter exposure, the averaged values of pressure and temperature for that period and the operating as well as the failure status. The DIGITEL HVS DH-77 is construed strictly modular, so that all electrical and mechanical function blocks are easily replaceable. The

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Mo 12.01.04 12:05:28 Start of program
Mo 12.01.04 12:05:28 Work

Mo 12.01.04 12:05:37 Blower on
Mo 12.01.04 12:07:37 Motor load : 65 %

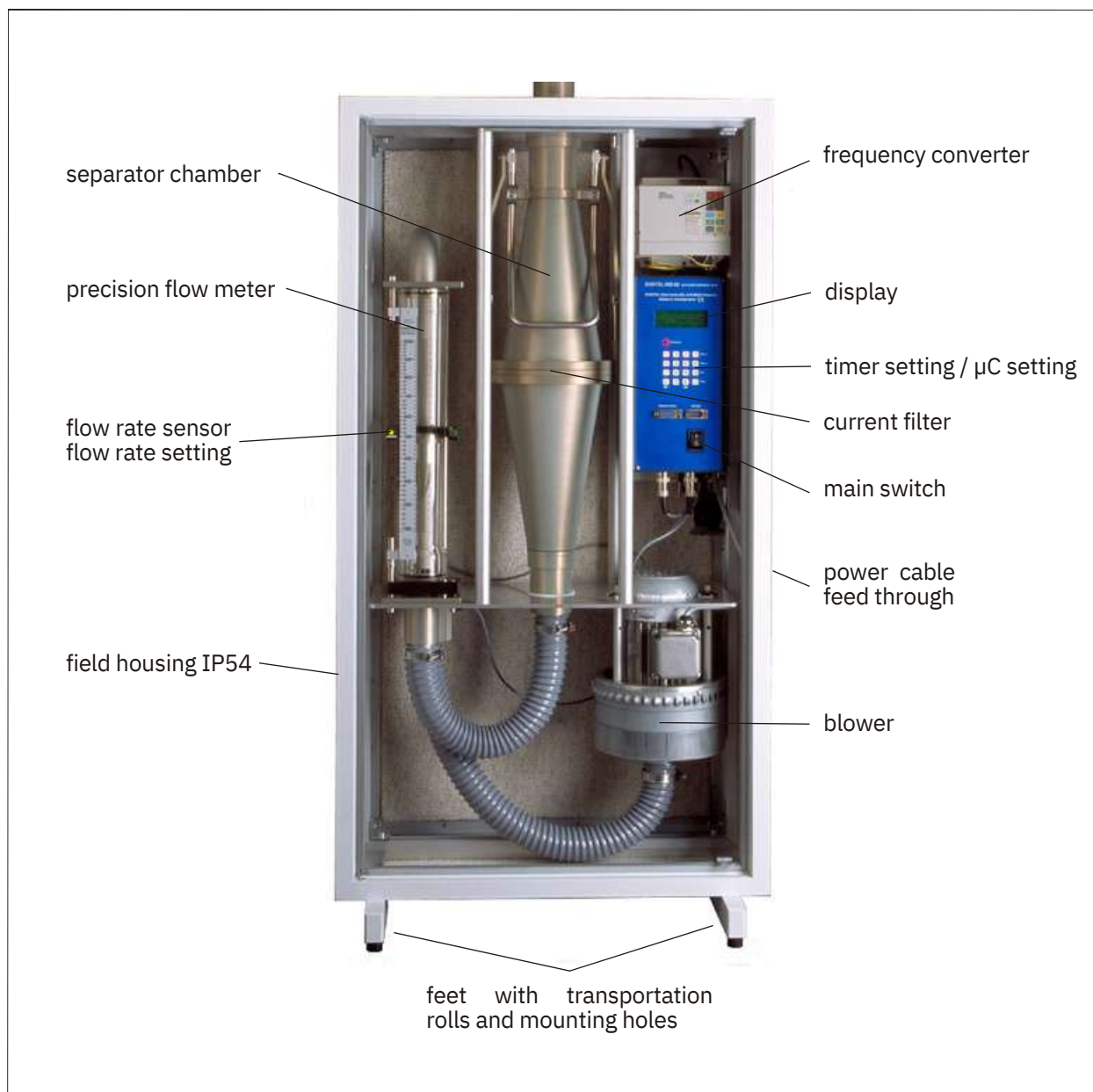
Tu 13.01.04 12:05:28 Pause

Tu 13.01.04 12:05:28 End of program
Tu 13.01.04 12:05:30 Blower off

Collecttime[min]: 1399,96
paM [mbar]: 929
TaM [°C]: 20,0
cM( 20/ 929) : 1,054
cs( 15/1013) : 0,949
cA( 17/ 962) : 1,007
VM( 20/ 929)[m3]: 755,146
Vs( 15/1013)[m3]: 680,539
VA( 17/ 962)[m3]: 721,591
at 512 l/min
    
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Printer protocol

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DIGITEL HVS DH-77 is examined and tested in practice in the monitoring networks of different European countries. These long-term and varied field experiences have led to the efficiency and reliability of the equipment. The DIGITEL HVS DH-77 is described in the VDI/DIN guideline VDI 2463 page 11. In connection with a DIGITEL PM10 pre-separator (DPM10/30/00) or a DIGITEL PM2,5 pre-separator (DPM2,5/30/00) the system is approved according to reference method EN12341. In connection with a DIGITEL PM1 (DPM 01/30/00) PM1 measurements can be made. On the illuminated

LCD display the current state of the sampling course can be read at any time (e.g. program status, current status, failure indication messages). In case of power failure, all settings are kept stored. Then the time program is internally running in the standard pre-setting. Therefore programmed time settings are not postponed in case of meantime power interruptions. The DIGITEL HVS DH-77 supplies a serie of digital interfaces to connect the protocol printer, to activate the remote control and to manage data in- and output using different formats (eg. Bayern-Hessen, AK, TCP/IP, etc.). An analogue

interface enables the easy external registration of the sampling course as well as for the remote control. The DIGITEL HVS DH-77 is equipped with a protection class IP54 field case. For that reason it is directly suitable for open-air installation under European standard weather conditions. The extraordinary compact type of construction, especially the low depth, allows that even the field equipment can be installed in a container economically

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## Accessories:

For total suspended particulates (TSP) sampling, two various designed pre-separators are available: a cylinder probe (EMPA/UBA probe and a probe of „open circular slot“ according to VDI.

For PM10 or PM2.5 sampling pre-separators designed as single-stage impactors are available. They are constructed for an operational volume flow of 30 m<sup>3</sup>/h. Approved according to reference method EN12341.

For PM1 sampling pre-separators designed as double-stage impactors are available. They are constructed for an operational volume flow of 30 m<sup>3</sup>/h .

A protocol printer, and memory card (PCMCIA) provide for the recording of operating and error status in real time.

Interfaces RS-232C, RS-485, Ethernet, analogue, radio modem (via RS-232C) enable data logging and activate remote control.

Directional sampling dependent on meteorological data e.g. wind direction and wind speed counts to the options as well.

The PAH manual changed cartridge holder or cartridge changer offers the possibility for sampling aerosols and volatile substances with PU-foam or granulates in series to the current filter. The device is available in modular construction for user specific installation.

Technical data	DIGITEL DH-77
Flow rate	100 - 1.000 l/min (6 - 60 m <sup>3</sup> /h)
Time programs	Work, Pause (0 to 59.999 minutes each); start time adjustable using date and time
Filters	1 round filter of d = 150 mm (flowing area of d = 140 mm); filter material depends on the aim of analysis
Settings reproducible accuracy (according to UMEG report No. 6-08/00)	+/- 0.45%
Logged standard and measured volumes Accuracy	< +/- 2%
"Volume flow" Control accuracy	< 5 % of MRV (uncalibrated)
Suction unit, mean life cycle	> 36.000 h
Underpressure at 1.000 l/min.	max. 130 mbar
Internal data memory	capacity of min. 30 records (ringbuffer)
Interfaces	RS-232C
Interface protocols	DIGITEL, Bayern-Hessen, AK
Power supply	230 V +/- 10 %; 50 Hz; max. 1.700 VA
Application range	5 to 40°C; 10 to 90 % RH or -20 to 40°C; 10 to 95 % RH with interior heating, maximum operation altitude of 2.000 m above the sea level
Type	Field housing
Protection class	IP54
Outer dimensions (H x W x D)	1.155 mm x 600 mm x 250 mm
Weight	46 kg
Features	Overloading switch-off, Blower-load indication, Battery-backed data memory
Pre-separator heater control	24,5 V; 50 Hz; 160 VA max.
<b>Options</b>	
Pre-separator	TSP, PM10, PM2.5, PM1
Pre-separator heating	Regulated, max. 52 W; with built-in over-temperature protection
PAH cartridge holder	Available
Memory cards (PCMCIA) internal	Available
Log printer	Available
Interfaces	RS-485, Ethernet
Interface protocols	customer-specific
External meteorological data sensing	Available

